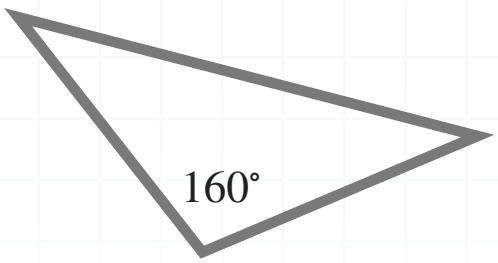
Topic: Pythagorean inequalities

Question: Classify the triangle.



Answer choices:

A Equilateral

B Acute

C Similar

D Obtuse

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Solution: D

The triangle is an obtuse triangle because it includes an obtuse angle, which is an angle that's greater than $90°$.

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Question: In which case below is the obtuse angle the largest?

ΔABC is an obtuse triangle and has sides a, b, and c, in which $a < b < c$.

Triangle	Side a	Side b	Side c
I	9	12	16
II	9	12	17
III	9	12	18
IV	9	12	19

Answer choices:

A I

B II

C III

D IV

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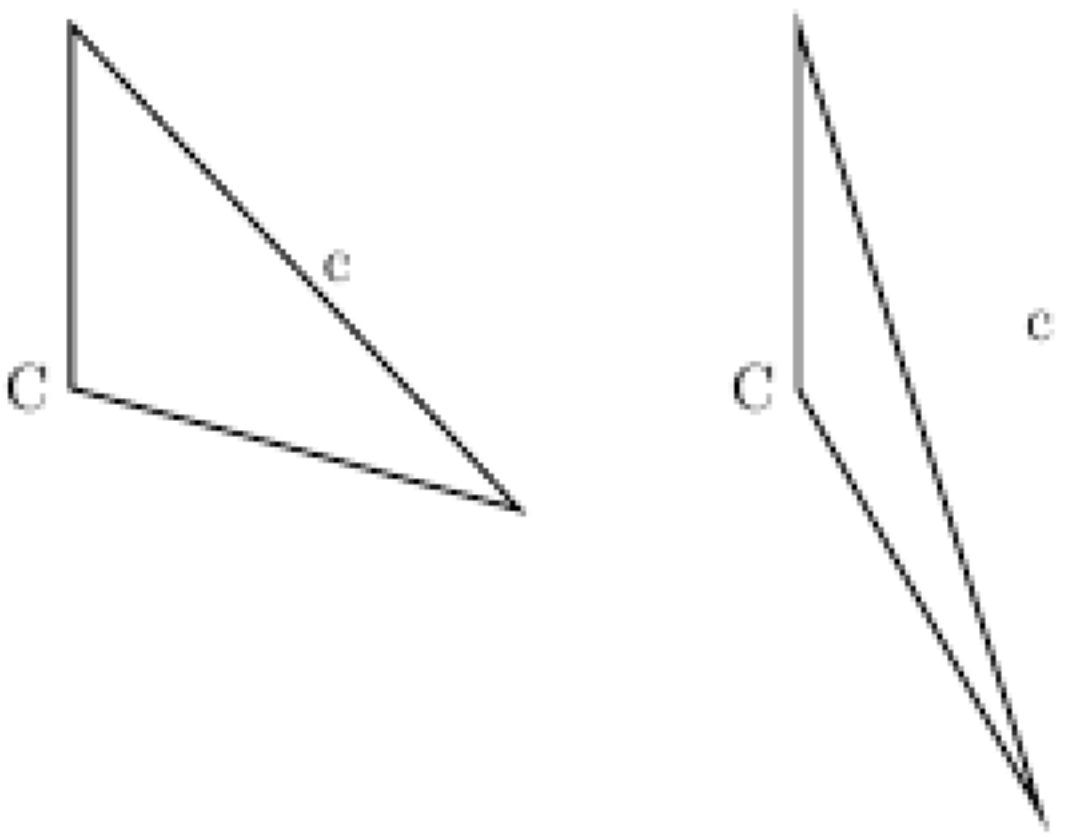
Solution: D

In every triangle ABC with obtuse angle C, $c^2 > a^2 + b^2$, but you don't need to do any calculations for this one. The larger that side c is, the larger angle C is. In the table, Triangle IV has the largest value of c, so it will have the largest obtuse angle C.

As an example, check out the two obtuse triangles below. One has side c longer than the other, and you can see how angle C is much bigger as a result.



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Topic: Pythagorean inequalities

Question: Which triangles have sides that are those of a right triangle?

ΔABC has sides a, b, and c, in which $a \leq b \leq c$.

Triangle	Side a	Side b	Side c
I	5	$5\sqrt{3}$	10
II	9	12	15
III	$\sqrt{2}$	$\sqrt{2}$	2

Answer choices:

A II and III

B I and III

C I, II, and III

D None of these

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Solution: C

For each triangle in the table, we need to check to see if $a^2 + b^2 = c^2$.

For triangle I:

$$a^2 + b^2 = c^2$$

$$5^2 + \left(5\sqrt{3}\right)^2 = 10^2$$

$$25 + 25(3) = 100$$

$$25 + 75 = 100$$

$$100 = 100$$

For triangle II:

$$a^2 + b^2 = c^2$$

$$9^2 + 12^2 = 15^2$$

$$81 + 144 = 225$$

$$225 = 225$$

For triangle III:

$$a^2 + b^2 = c^2$$

$$\left(\sqrt{2}\right)^2 + \left(\sqrt{2}\right)^2 = 2^2$$

$$2 + 2 = 4$$

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$$4 = 4$$

Because all three of these equations were true, all three triangles are right triangles.

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